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Fallen-Bailey

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(54) **READY-TO-DIAL GLOBAL PHONE NUMBERS**

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H04M 3/42 (2006.01)

(52) **U.S. Cl.**
CPC ***H04M 3/4931*** (2013.01); *H04M 3/42357* (2013.01); *H04Q 2213/1307* (2013.01); *H04Q 2213/13097* (2013.01); *H04Q 2213/13103* (2013.01); *H04Q 2213/13389* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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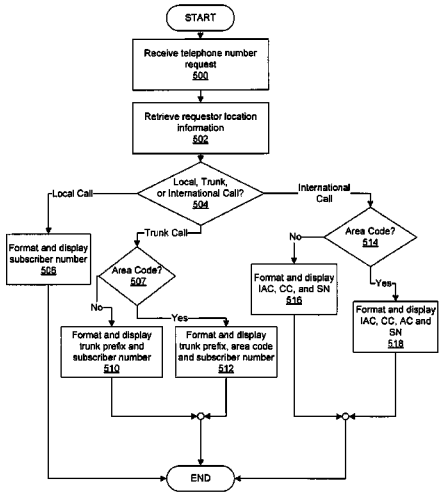
(57) **ABSTRACT**

A method, computer-readable medium, and apparatus for providing ready-to-dial global phone numbers is provided. In one embodiment of the present invention, a telephone number parser parses a received telephone number into a collection of telephone number components. The telephone number parser validates each telephone number component of the collection of telephone number components. A telephone number manager stores the collection of telephone number components. In response to receiving a request for a telephone number, a telephone number assembler generates the telephone number from the collection of telephone number components. The telephone number is configured to be successfully dialed from a location from which the telephone number is to be dialed. Finally, the telephone number manager displays the telephone number.

25 Claims, 8 Drawing Sheets



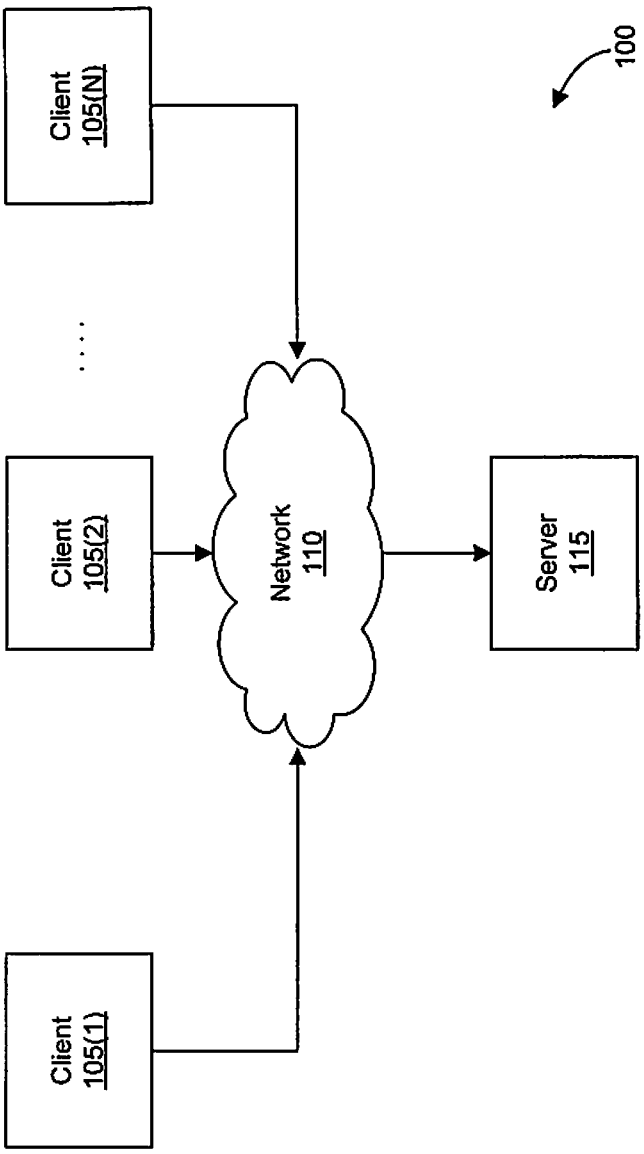

Client 105(N)
Client 105(2)
Client 105(1)
Network 110
Server 115
100

Fig. 1

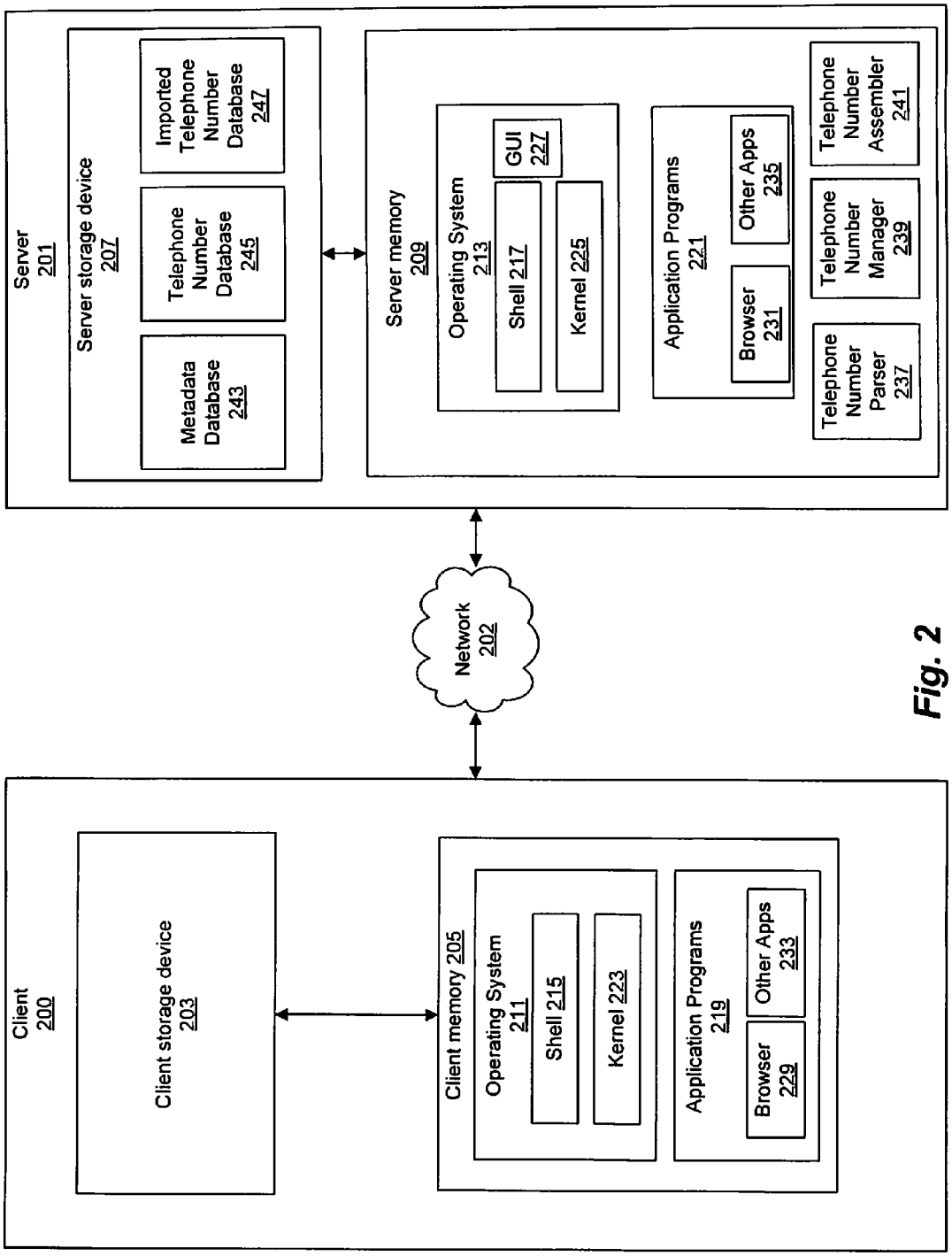

Server
201
Server storage device
207
Metadata Database
243
Telephone Number Database
245
Imported Telephone Number Database
247
Server memory
209
Operating System
213
Shell 217
Kernel 225
GUI
227
Application Programs
221
Browser
231
Other Apps
235
Telephone Number Parser
237
Telephone Number Manager
239
Telephone Number Assembler
241
Network
202
Client
200
Client storage device
203
Client memory 205
Operating System
211
Shell 215
Kernel 223
Application Programs
219
Browser
229
Other Apps
233

Fig. 2

Country Name 302	Country Code 304	Trunk Prefix 306	International Access Code 308	ISO Two-Letter ID 310	ISO Three-Letter ID 312
Afghanistan	93	0	00	AF	AFG
Albania	355	0	00	AL	ALB
Algeria	213	0	00	DZ	DZA
American Samoa	1	1	011	AS	ASM
Andorra	376		00	AD	AND
Angola	244	0	00	AO	AGO
. . .	. . .	. . .	. . .	. . .	. . .
USA	1	1	011	US	USA
. . .	. . .	. . .	. . .	. . .	. . .

Metadata database 300

Fig. 3A

Contact ID 350	Country ID 352	Phone Type 354	Area Code 356	Subscriber Number 358	Extension 360
User 1	USA	Landline	650	5551234	<null>
User 2	Canada	Mobile	416	5555678	<null>
. . .	. . .	. . .	. . .	. . .	. . .
User N	United Kingdom	Fax	734	25559012	241

Telephone number database 338

Fig. 3B

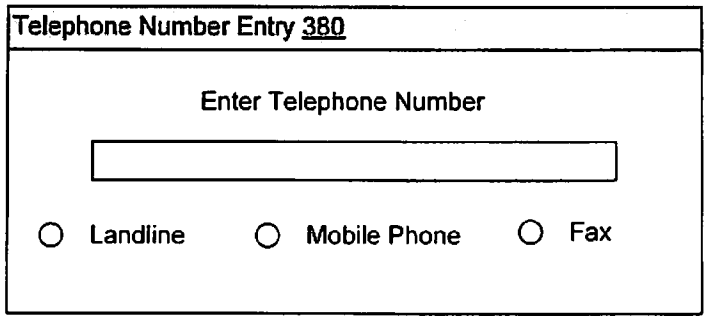


Fig. 3C

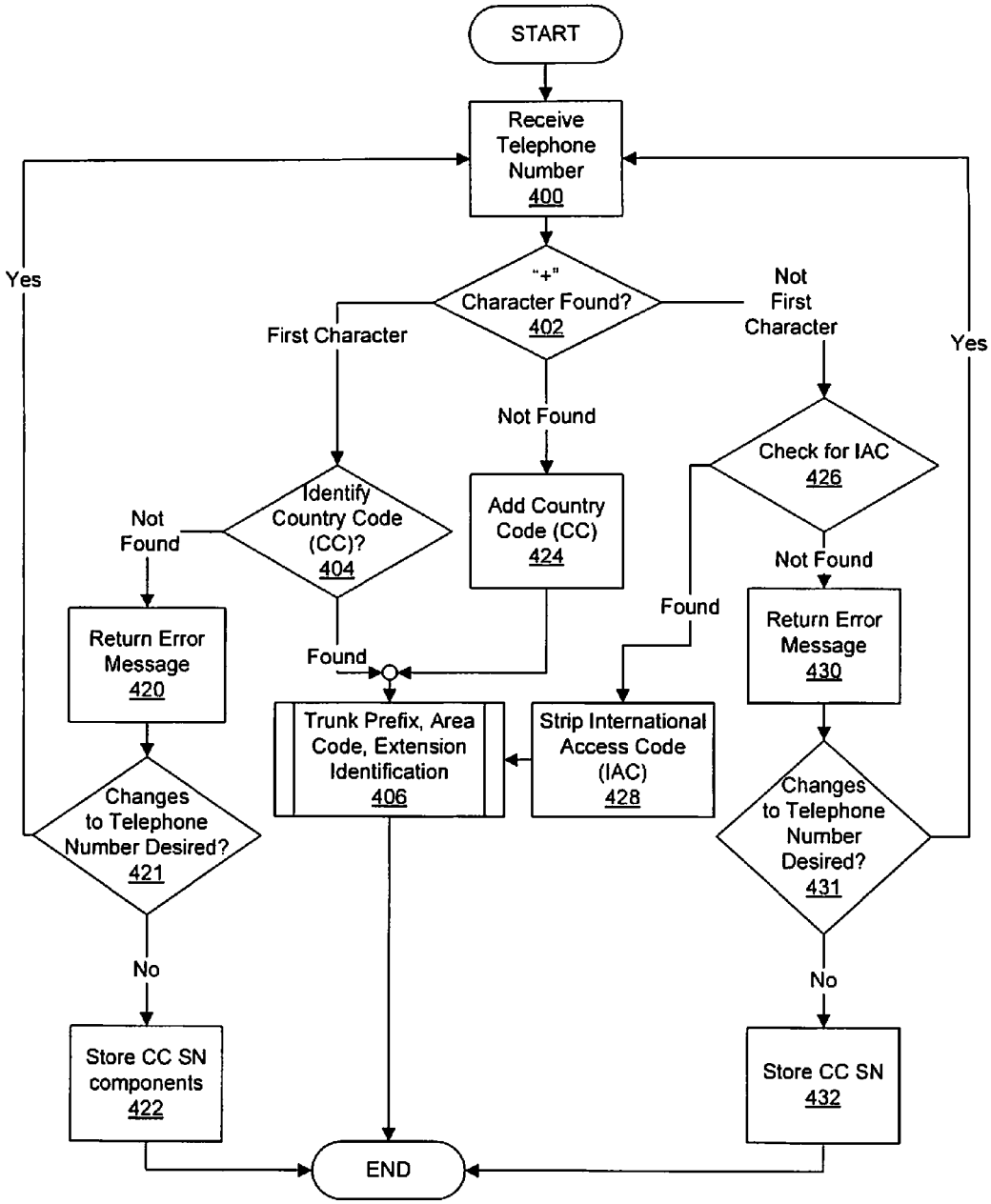

START
Receive Telephone Number 400
"+" Character Found? 402
First Character
Not First Character
Not Found
Yes
Identify Country Code (CC)? 404
Not Found
Found
Add Country Code (CC) 424
Check for IAC 426
Found
Not Found
Return Error Message 420
Trunk Prefix, Area Code, Extension Identification 406
Strip International Access Code (IAC) 428
Return Error Message 430
Changes to Telephone Number Desired? 421
No
Changes to Telephone Number Desired? 431
Yes
No
Store CC SN components 422
Store CC SN 432
END

Fig. 4A

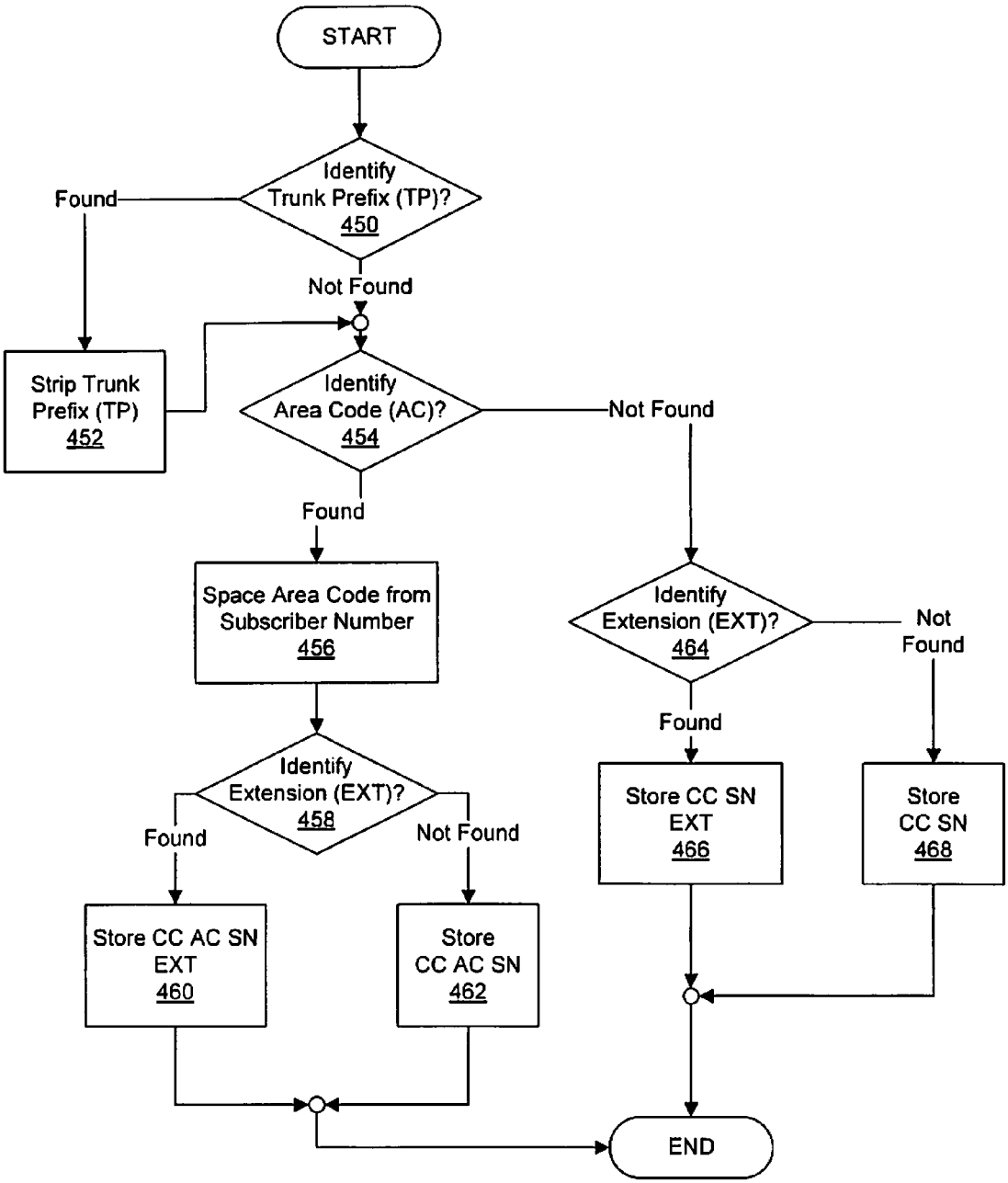

START
Identify Trunk Prefix (TP)? 450
Found
Not Found
Strip Trunk Prefix (TP) 452
Identify Area Code (AC)? 454
Not Found
Found
Space Area Code from Subscriber Number 456
Identify Extension (EXT)? 458
Found
Not Found
Store CC AC SN EXT 460
Store CC AC SN 462
Identify Extension (EXT)? 464
Not Found
Found
Store CC SN EXT 466
Store CC SN 468
END

Fig. 4B

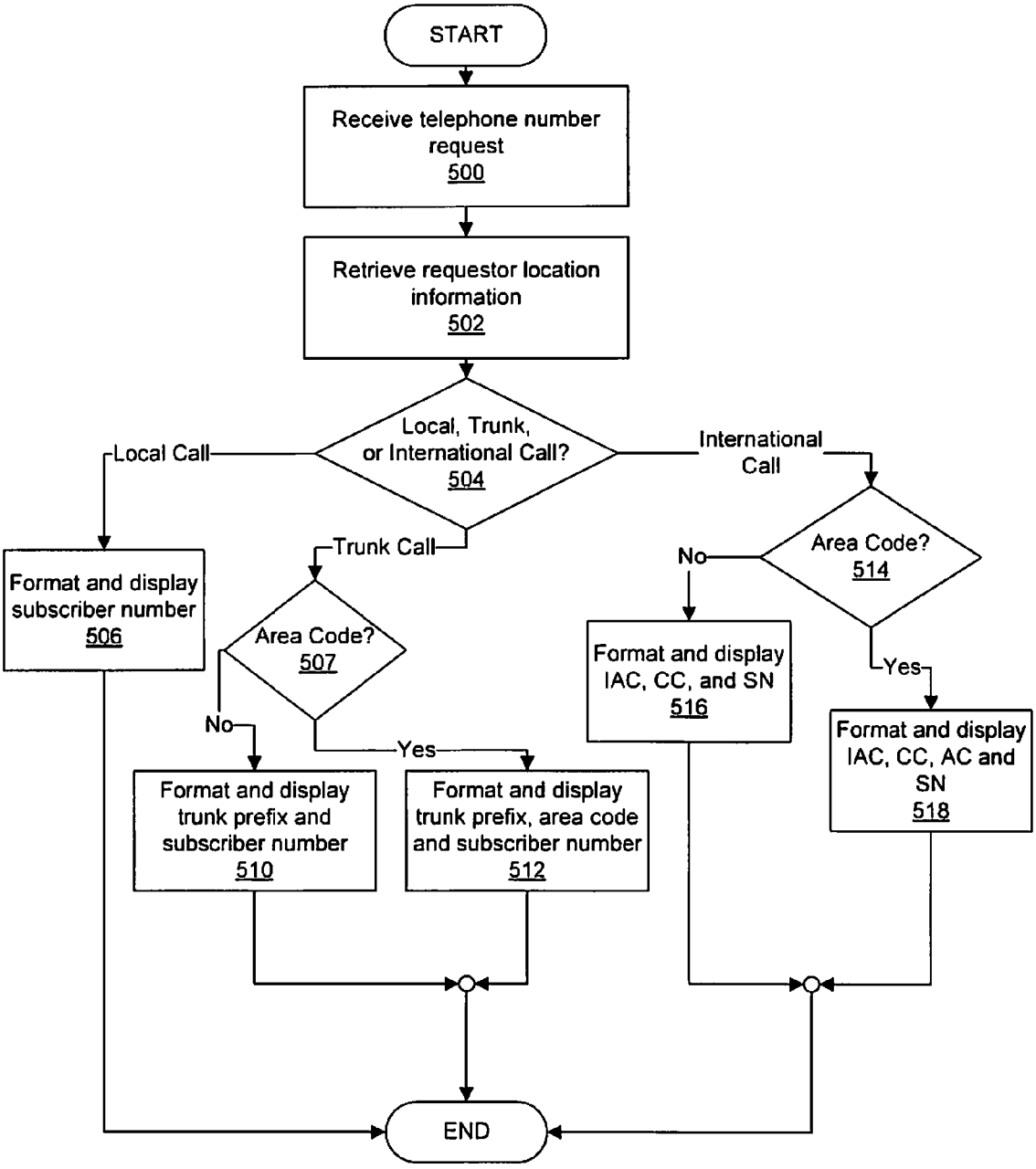

START
Receive telephone number request
500
Retrieve requestor location information
502
Local, Trunk, or International Call?
504
Local Call
Trunk Call
International Call
Format and display subscriber number
506
Area Code?
507
No
Yes
Format and display trunk prefix and subscriber number
510
Format and display trunk prefix, area code and subscriber number
512
Area Code?
514
No
Yes
Format and display IAC, CC, and SN
516
Format and display IAC, CC, AC and SN
518
END

Fig. 5

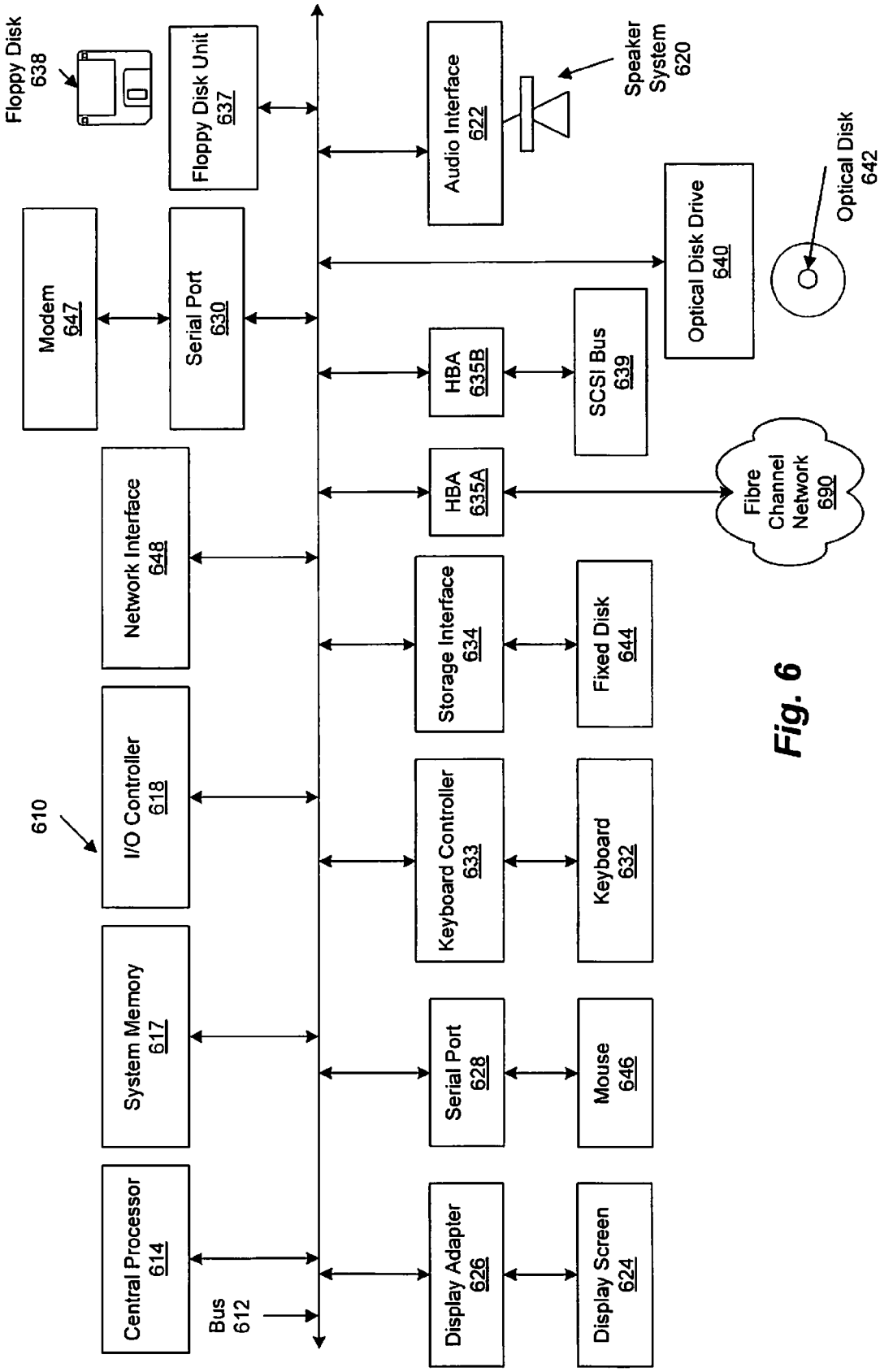

Floppy Disk 638
Floppy Disk Unit 637
Audio Interface 622
Speaker System 620
Modem 647
Serial Port 630
HBA 635B
SCSI Bus 639
Optical Disk Drive 640
Optical Disk 642
Network Interface 648
HBA 635A
Fibre Channel Network 690
610
I/O Controller 618
Storage Interface 634
Fixed Disk 644
System Memory 617
Keyboard Controller 633
Keyboard 632
Central Processor 614
Serial Port 628
Mouse 646
Bus 612
Display Adapter 626
Display Screen 624

Fig. 6

READY-TO-DIAL GLOBAL PHONE NUMBERS

BACKGROUND

Telephone numbers can be expressed as a local number, a long distance number, or as an international number. When telephone numbers are entered into a computer system, such telephone numbers need not be "dialable numbers" (i.e., telephone numbers that enable a caller to successfully connect to the purported destination associated with the telephone number). However, in the context of a customer relations management (CRM) system, for example, telephone numbers stored in such a CRM system should enable a caller to be successfully connected to the party (e.g., a customer or employee) associated with the telephone number, without the need for the caller to manipulate the telephone number.

Some computer systems (e.g., CRM systems) store millions to tens-of-millions of telephone numbers. Of course, not all of these numbers are entered into the computer system (e.g., a CRM database) by a single person, a single group of people, or even at a single location. Thus, these telephone numbers may be entered in many different formats. For example, various users will employ different delimiters (e.g., periods, hyphens, parenthesis) to separate the different parts of a telephone number.

Not only will these telephone numbers be entered in different formats, a large percentage of them may be incorrect (due to user entry errors or other errors) or incomplete (missing certain information necessary to enable the telephone number to be dialed from certain locations).

Also, there is typically a large gap (temporally and geographically) between the entry of a telephone number and the actual use of a telephone number. For example, a telephone number might be entered into a computer system by a first user in the United States. Days, weeks, months, or even years later, a second user in France may retrieve the telephone number from the computer system and try to dial the telephone number. If the telephone number is incorrect, the first user may not be reachable in order to provide a correct telephone number.

In the field of computer integrated telephony (e.g., digital private branch exchange (PBX)), some digital PBX systems attempt to verify telephone numbers in a database to ensure that the telephone numbers are dialable. However, among other infirmities these systems perform such verification after the telephone numbers are entered into the database, at a point when the person that entered the telephone number is unavailable.

It is appreciated that "telephone number normalization" is sometimes employed to introduce a consistent format in which telephone numbers are expressed. Telephone number normalization is the translation of telephone numbers that are entered in various formats into a single standard format. One example of telephone normalization is the "international common format." However, in addition to the aforementioned difficulties, the mere fact that a telephone number is formatted according to a telephone number normalization rule does not make the telephone number automatically dialable from a given geographic location. A caller from a particular location may need to add digits to, or subtract digits from or otherwise reformat a telephone number to successfully connect to the destination associated with the telephone number. In this regard, many people do not know or fail to understand how to dial telephone numbers outside of their region to enable successful connections. These various issues, combined with the sheer number of telephone numbers often stored in telephone number databases, present a formidable challenge to the computer system's users to actually be successfully connected to the party associated with a given telephone number. Thus, there is a need for a more effective and reliable system for storing and accessing telephone numbers in computer systems.

SUMMARY

Embodiments of the present invention include a method, computer-readable medium, and apparatus for providing ready-to-dial global phone numbers. In one embodiment of the present invention, a telephone number parser parses a received telephone number into a collection of telephone number components. The telephone number parser validates each telephone number component of the collection of telephone number components. A telephone number manager stores the collection of telephone number components. In response to receiving a request for a telephone number, a telephone number assembler generates the telephone number from the collection of telephone number components. The telephone number is configured to be successfully dialed from a location from which the telephone number is to be dialed. Finally, the telephone number manager displays the telephone number.

The foregoing is a summary and thus contains, by necessity, simplifications, generalizations and omissions of details; consequently, those skilled in the art will appreciate that the summary is illustrative only and is not intended to be in anyway limiting. As will also be apparent to one of skill in the art, the operations disclosed herein may be implemented in a number of ways, and such changes and modifications may be made without departing from this invention and its broader aspects. Other aspects, inventive features, and advantages of the present invention, as defined solely by the claims, will become apparent in the non-limiting detailed description below.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention may be better understood, and its numerous objects, features and advantages made apparent to those skilled in the art by referencing the accompanying drawings.

FIG. **1** is a simplified block diagram illustrating an example of a network architecture in which one or more clients have network access to a server.

FIG. **2** is a simplified block diagram that depicts an example relationship between a client and a server.

FIG. **3**A is an example of a metadata database.

FIG. **3**B is an example of a telephone number database.

FIG. **3**C is an example of a telephone number entry screen.

FIG. **4**A is a simplified flow diagram illustrating an example of operations carried out by a server in parsing a telephone number.

FIG. **4**B is a simplified flow diagram depicting an example of trunk prefix, area code, and extension identification operations carried out by a server.

FIG. **5** is a simplified flow diagram illustrating an example of operations carried out by a server in servicing a telephone number request.

FIG. **6** is a simplified block diagram that illustrates an example of a computer system suitable for implementing embodiments of the present invention.

DETAILED DESCRIPTION

Introduction

Embodiments of the present invention provide for the receipt, parsing, validation, and generation of telephone numbers. As will be appreciated, embodiments of the present invention decompose a received telephone number into a collection of telephone number components. Upon receipt of a request for a telephone number, embodiments of the present invention re-assemble the telephone number from the collection of telephone number components, while considering the geographic location from which the request originated.

According to embodiments of the present invention, a telephone number manager on a server, for example, receives a telephone number from a client. According to other embodiments of the present invention, the telephone number manager coordinates the batch processing of a collection of telephone numbers from, for example, an imported telephone number database from a computer system located in a different geographic region. A telephone number parser scans the telephone number to determine the overall format (i.e., whether the received telephone number is a local, long distance, or international number). Once the telephone number parser determines the overall format of the telephone number, the telephone number parser decodes the telephone number by identifying a collection of telephone number components. The telephone number parser stores the collection of telephone number components within a database. According to alternative embodiments of the present invention, a user can verify the telephone number for accuracy. In other embodiments of the present invention, the telephone number manager can validate the collection of telephone number components. The telephone number manager performs such validation by comparing the collection of telephone number components with a table of known telephone number components for each country and/or city. According to some embodiments of the present invention, this table is implemented as a metadata database.

The server also services requests for "ready-to-dial" telephone numbers from clients. A "ready-to-dial" telephone number is a telephone number that is formatted such that a caller located at the requesting client's geographical location can dial the "ready-to-dial" telephone number and be successfully connected. Upon receiving a request for a ready-to-dial telephone number from a client, the telephone number manager retrieves the client's geographic location. According to other embodiments of the present invention, the client can specify (e.g., within the request) a particular geographic location that is different from the client's geographic location. The telephone number manager determines a target location of the requested ready-to-dial telephone number. A telephone number assembler adds necessary codes to assemble the ready-to-dial telephone number. The telephone number manager presents the ready-to-dial telephone number to the client.

According to some embodiments of the present invention, the telephone number manager can present the ready-to-dial telephone number to the client in a variety of ways. The presentation of the ready-to-dial telephone number includes, but is not limited to: displaying the ready-to-dial telephone number, automatically dialing the ready-to-dial telephone number, and/or sending the ready-to-dial number to a remote location via e-mail, short message service (SMS), instant messaging (IM) service, or any other type of messaging service.

According to some embodiments of the present invention, upon client request, the telephone number manager can incorporate dialing codes into the ready-to-dial telephone number, such as dialing codes for specifying a long distance provider into the ready-to-dial telephone number. For example, a client may request that the telephone number manager preface the ready-to-dial telephone number with a "1010-xxx" code, wherein the "xxx" is a three-digit long distance provider identification code.

Telephone Number Components

As described herein in greater detail, embodiments of the present invention identify a collection of telephone number components within the telephone numbers received from a client or from an imported telephone number database. These telephone number components can include, but are not limited to:

Country Code (CC): Generally, a country code is an alphabetic or numeric geographical code that represents a particular country, Standard country code systems that can be used by embodiments of the present invention include, but are not limited to: ISO 3166-1 alpha 2 (two-letters), ISO 3166-1 alpha 3 (three-letters), and the E.164 country calling codes system.

Trunk Prefix (TP): Trunk prefixes are one or more digits that are normally needed to dial a telephone number domestically (i.e., within the same country). Trunk prefixes are typically not necessary to dial local telephone numbers (i.e., telephone numbers within the same area code). For example, in the United States of America, the trunk prefix is "1" (e.g., 1-323-555-7234), but in other countries, the trunk prefix is "0". A trunk prefix is not used in all countries.

Area Code (AC) and Subscriber Number (SN): An area code identifies a particular region within a country. Several countries have area codes ranging between 2-5 digits and subscriber numbers ranging between 5-8 digits. According to some embodiments of the present invention, an area code can be identified by delimiters that separate the area code from a subscriber number. A delimiter can be any of a number of characters and may include delimiters such as parenthesis, dashes, and/or spaces. For example, some area code/subscriber number combinations can be represented as: (323) 555-7234, 323-555-7234, 323 555 7234. A subscriber number is a telephone number that is assigned to a particular subscriber within a region defined by an area code.

Extension (EXT): The extension number enables a single subscriber number to be distributed among multiple users. According to an embodiment of the present invention, an extension number can be identified in a telephone number if there is an extension delimiter separating the extension from the subscriber number. An extension delimiter can be implemented by any predetermined character.

International Access Code (IAC): An International Access Code is a group of digits a user (or computer) dials to indicate that the telephone number being dialed is in a different country. For the United States, the International Access Code is "011", but in many other countries in the world, the International Access Code is "00". For example, assuming that a user in the United States has the telephone number (123) 456-7890 and a user in the United Kingdom has the telephone number 987 654 321, the user in the United States would dial "011 44 987 654 321" to reach the user in the United Kingdom. The user in the United Kingdom would dial "00 1 123 456 7890" to reach the user in the United States.

Validation Rules

Embodiments of the present invention use the following concepts for storing and generating ready-to-dial telephone numbers:

(1) If there are enough digits to dial a telephone number for a given country, the telephone number is accepted and stored according to parsing and validation rules dictated by a telephone number parser, which is discussed herein in greater detail.

(2) If there are not enough digits to dial the telephone number for a given country:

(a) In an online mode (where a user is submitting the telephone number via a client to a server), the telephone number is rejected and the user is given an appropriate error message. The user can then re-enter a telephone number to correct the error indicated in the error message. Embodiments of the present invention, especially in online mode, enable real-time verification of telephone numbers while the user entering the telephone number is present. Real-time verification helps reduce the number of incorrect telephone numbers that cannot be verified at a later date because the user entering the telephone number may be unavailable or unreachable at the later date;

(b) In batch mode (where a batch of telephone numbers from (for example) an imported telephone number database is processed at one time):

(i) If the telephone numbers are successfully parsed and validated, the telephone numbers are accepted and log entries recording the operation are generated.

(ii) If the telephone numbers are not successfully parsed or validated, the telephone number is accepted, but a flag indicating that the telephone number may not be valid is set.

(iii) In either case (i) or case (ii), if the telephone number later shows up in online mode, the telephone number is subject to the validation concepts of the online mode.

Parsing (Inbound), Validation and Storage

According to some embodiments of the present invention, a key piece of information on which the abovementioned validation is based is the country code. A primary goal of some embodiments of the present invention (e.g., systems intended for user by multi-national businesses) is to ensure that many of the stored telephone numbers have an associated country code. Parsing of telephone numbers is still performed to identify and validate other telephone number components, if possible. To assist in parsing of telephone numbers, metadata is provided in a database resident in, for example, a server storage device. Some embodiments of the present invention parse any given telephone number without any prior knowledge of the source of the telephone number.

When parsing a received telephone number, some embodiments of the present invention validate the abovementioned international code, country code, and city codes by accessing a metadata database of such codes. Validating a subscriber number involves ensuring that the subscriber number meets certain number length requirements. The subscriber number length requirements vary depending on the country from which the telephone number is located. For example, in the United States of America, the subscriber number length requirement is seven numbers (e.g., 555-1234). An extension can be validated by an extension number length check as well. A system administrator can specify a specific length for extension number validations. In other embodiments of the present invention, an extension can be identified if there is a delimiter (e.g., a space, hyphen, or other predefined character) separating the extension from the subscriber number. Because the time (and geographical distance) between the entering of and retrieving of a telephone number can be great, validation upon entry, at the time when the person entering the telephone number is accessible, facilitates increased accuracy of the telephone numbers stored in the database.

Request Processing

According to some embodiments of the present invention, a client (which can be implemented as a client computer, software on a client computer, such as a browser, or a user accessing a server via a client computer) sends a request for a ready-to-dial telephone number to a server. A telephone number manager (on the server, for example) receives the request from the client and retrieves location information associated with the client that submitted the request. A telephone number assembler then determines if the ready-to-dial telephone number should be formatted as a local, trunk, or international call. The telephone number assembler retrieves telephone number components from the telephone number database, assembles the requested ready-to-dial telephone number, and the telephone number manager presents the ready-to-dial telephone number to the client.

Batch Processing

According to other embodiments of the present invention, batch processing of a collection of telephone numbers can be implemented. A first telephone number database from a first region can be imported to a second telephone number database stored on a computer system located in a second region. The first and second regions can be located in different cities, area codes, states, or even countries. Batch processing enables the import of a first telephone number database containing telephone numbers that may not be validated, into a second telephone number database.

For example, a first telephone number database from a CRM system located in the United States of America might be imported into a second telephone number database stored on a CRM system used by a call center located in India. The telephone numbers stored in the first telephone number database are likely formatted according to a variety of formats, given that these telephone numbers were likely entered by many different individuals. These telephone numbers would not be immediately "ready-to-dial," particularly from another location such as India. Embodiments of the present invention can import the first telephone number database, batch process the telephone numbers in that database to generate a collection of telephone number components, and import the telephone number components into the second telephone number database. Upon request from a user located in India, the imported telephone number components can be reassembled by a telephone number assembler and various codes can be added to the telephone number components to generate a "ready-to-dial" telephone number from the user's location in India.

Online Mode Processing

According to other embodiments of the present invention, real-time validation and processing of telephone numbers can be implemented. A single telephone number database, containing validated telephone number components, can be accessed remotely by users in a number of locations. The users can enter telephone numbers to the telephone number database and a telephone number parser located on the server validates the telephone number upon entry. Either batch processing (as previously discussed) or online mode processing allows real-time validation of telephone numbers. The telephone number parser parses the telephone number into telephone number components. Later, the telephone number components can be accessed from any location (e.g., foreign

call centers, smart phones, and so on), and a "ready-to-dial" telephone number is provided. The telephone number database is thus accessed from any number of such locations and a telephone number assembler reassembles ready-to-dial telephone numbers for those locations upon request.

An Example Architecture of Telephone Number Management

FIG. **1** is a simplified block diagram illustrating a network architecture **100** in which one or more clients are provided with access to a server via various network connections. As depicted in FIG. **1**, clients **105**(**1**)-**105**(N) are coupled to a network **110**, and so are able to access a server **115** via network **110**. A client can be implemented using, for example, a desktop computer, a laptop computer, a workstation, a server, a cell phone, a smart phone, a network-enabled personal digital assistant, PDA or the like. An example of network **110**, which can be used by clients **105**(**1**)-**105**(N) to access server **115**, is the Internet. Alternatively, access to server **115** can be provided by a local area network (LAN) utilizing Ethernet, IEEE 802.11x, or some other communications protocol. As will be appreciated, server **115** can be accessed by clients coupled directly thereto (not shown). Those of skill in the art will further appreciate that example network **100** may include other components such as routers, firewalls and the like that are not germane to the discussion of the present network and will not be discussed further herein.

FIG. **2** is a simplified block diagram that depicts an example relationship between a client and a server. As illustrated, a client **200** (which can be utilized to implement clients **105**(**1**)-**105**(N) of FIG. **1**) is coupled to a server **201** (which can be utilized to implement server **115** of FIG. **1**) via a network **202** (which can be utilized to implement network **110** of FIG. **1**). Client **200** is further includes a client storage device **203** and a client memory **205**. Server **201** further includes a server storage device **207** and a server memory **209**.

Client memory **205** and server memory **209** have resident therein operating systems **211** and **213**, which further include shells **215** and **217** (as referred to in the UNIX® operating system) for providing transparent user access to resources such as application programs **219** and **221**. Generally, shells **215** and **217**, also referred to as command processors in the Microsoft® Windows® operating system, are generally the highest level of the operating system hierarchy and serve as command interpreters. Shells **215** and **217** provide system prompts, interpret commands (e.g., entered by keyboard, mouse or other input media), and send the interpreted commands to the appropriate lower levels of the operating system (e.g., kernels **223** and **225**) for processing. Note that while shells **215** and **217** are depicted as text-based, line-oriented user interfaces, embodiments of the present invention support other user interface modes, such as graphical (e.g., a graphical user interface (GUI) **227**), voice, gestural and the like.

As depicted, operating systems **211** and **213** also include kernels **223** and **225**, which include functionality for the lower levels of operating systems **211** and **213**, as well as application programs **219** and **221**, Such lower levels include memory management, process and task management, disk management, and mouse and keyboard management. Application programs **219** and **221** also include browsers **229** and **231**, used to access network **202**, word processors (not pictured), spreadsheets (also not pictured), and other application programs **233** and **235**.

Server memory **209** also maintains a telephone number parser **237**, a telephone number manager **239**, a telephone number assembler **241**, all of which are discussed herein in greater detail. Server storage device **207** includes a metadata database **243** and a telephone number database **245** for storing parsed telephone number components. According to some embodiments of the present invention, an imported telephone number database **247** can be included in server storage device **207**. Imported telephone number database **247** can include telephone numbers from a different computer system. Some embodiments of the present invention implement batch processing of telephone numbers from an imported telephone number database (e.g., imported telephone number database **247**) to parse and validate the imported telephone numbers as discussed herein in greater detail in conjunction with FIGS. **4**A and **4**B.

According to embodiments of the present invention, telephone number manager **239** receives a telephone number from a client (e.g., client **200**). Telephone number manager **239** forwards the telephone number to telephone number parser **237**. Telephone number parser **237** scans the telephone number to determine the overall format (i.e., whether the received telephone number is a local, long distance, or international number). Once telephone number parser **237** determines the overall format of the telephone number, telephone number parser **237** decodes the telephone number by identifying a collection of telephone number components. Telephone number parser **237** stores the collection of telephone number components within a database (e.g., telephone number database **245**). According to alternative embodiments of the present invention, a user can verify the decoded telephone number. In other embodiments of the present invention, telephone number manager **239** can validate the decoded collection of telephone number components. Telephone number manager **239** performs such validation by comparing the collection of telephone number components with a table of known telephone number components (e.g., metadata database **243**) for each country.

Server **201** also services requests for "ready-to-dial" telephone numbers from clients. A "ready-to-dial" telephone number is a telephone number that is formatted such that a caller located at the requesting client's geographical location can dial the "ready-to-dial" telephone number and will be successfully connected. Upon receiving a request for a ready-to-dial telephone number from a client, telephone number manager **239** retrieves the client's geographic location. According to other embodiments of the present invention, the client can specify within the request a particular geographic location (which may be that is different from the client's geographic location). Telephone number manager **239** determines a target location of the requested ready-to-dial telephone number and telephone number assembler **241** adds necessary codes to assemble the ready-to-dial telephone number. Telephone number manager **239** then presents the ready-to-dial number to the client.

FIG. **3**A is an example of a metadata database. Metadata database **300** (which can be use to implement metadata database **243** of FIG. **2**) includes multiple columns: a country name column **302**, a country code column **304**, a trunk prefix column **306**, an international access code column **308**, an ISO Two-Letter ID column **410**, and an ISO Three-Letter ID column **412**. It will be appreciated that metadata database **300** is not limited to the metadata and categories of metadata (as shown by columns **302**, **304**, **306**, **308**, **310**, and **312**) illustrated in FIG. **3**A, but may include other types of metadata and metadata categories.

FIG. **3**B is an example of a telephone number database. Telephone number database **348** (which can be used to implement telephone number database **245**) includes multiple columns including a contact identification column **350**, a country identifier column **352**, a telephone type column **354**, an area

code column **356**, a subscriber number column **358**, and an extension column **360**. As discussed herein in greater detail in conjunction with FIGS. **4**A and **4**B, telephone number database **348** stores a collection of telephone number components identified in a telephone number received from a client (or an imported telephone number database, in the case of a batch processing job). Contact identification column **350** stores a user identifier associated with the corresponding telephone number. Country identification column **352** stores an identifier indicating a country in which the user is located. Telephone type column **354** identifies the type of service (e.g., landline, mobile, fax and the like) associated with the corresponding telephone number. Area code column **356**, subscriber number column **358**, and extension column **360** store the area code, subscriber number, and extension (if any) parsed from a telephone number received from a client or an imported telephone number database, for example.

FIG. **3**C is an example of a telephone number entry dialog box. Telephone number entry dialog box **380** can be displayed on a display coupled to a client (e.g., client **200** of FIG. **2**) by a graphical user interface (e.g., GUI **227** of FIG. **2**). As illustrated, telephone number entry dialog box **380** includes a single number entry field and radio buttons to enable a user to indicate if the entered telephone number is a landline, mobile, or fax number. Such indication enables a user to distinguish between the telephone numbers. For example, a user would not attempt to send a fax transmission to a telephone number clearly indicated as a landline or mobile telephone number. It is appreciated that other types of user interfaces with other numbers of entry fields and interface elements can be utilized to implement embodiments of the present invention.

FIG. **4**A is a simplified flow diagram illustrating an example of operations carried out by a server in parsing a telephone number. The process begins with a telephone number manager (e.g., telephone number manager **239** of FIG. **2**) receiving a telephone number from a client (e.g., client **200**), for example (step **400**). The telephone number manager forwards the telephone number to a telephone number parser (e.g., telephone number parser **237**), which parses the telephone number for a "+" character (step **402**). If the telephone number parser determines that the "+" character is the first character in the telephone number, the telephone number parser determining if a country code (CC) can be identified in the telephone number (step **404**). According to an embodiment of the present invention, the telephone number parser identifies the country code (CC) in the telephone number by comparing digits following the "+" character with a list of country codes in a metadata database (e.g., metadata database **243**). If a country code (CC) can be identified, the telephone number parser performs the trunk prefix, area code, and extension identification process (step **406**). The process then ends.

Returning to step **404**, if the telephone number parser cannot identify a country code (CC), the telephone number parser returns an error message to the telephone number manager (step **420**). According to some embodiments of the present invention the telephone number manager forwards the error message to the client, which then prompts the client to re-enter the telephone number, for example (step **421**). The re-entry request supports real-time validation of the telephone numbers since the client is readily available to make any corrections for telephone numbers that fail the telephone number manager's validation rules. If the client indicates a desire to re-enter the telephone number, the process returns to step **400**. If not, the telephone number manager then stores the CC and SN telephone number components in the telephone number database (step **422**). The process then ends.

Returning to step **402**, if the "+" character is not found, the telephone number parser adds a country code (CC) of the client's location to the telephone number. According to an embodiment of the present invention, the telephone number parser can look up the country code (CC) of the client's location from the metadata database. The telephone number parser then performs the trunk prefix, area code, and extension identification process (step **406**). The process then ends.

Returning once again to step **402**, if the "+" character is found in the telephone number received, but is not the first character in the telephone number, the telephone number parser checks the telephone number for a recognizable international access code (IAC) (step **426**). According to an embodiment of the present invention, the telephone parser identifies the international access code (IAC) in the telephone number by comparing digits following the "+" character with a list of known international access codes (IAC) in the metadata database. If an international access code (IAC) is found in the telephone number, the telephone number parser strips the telephone number of the international access code (IAC) (step **428**). The telephone number parser then performs the trunk prefix, area code, and extension identification process (step **406**). The process then ends.

Returning to step **426**, if the telephone number parser does not find an international access code (IAC) in the telephone number, the telephone number parser returns an error message (step **430**). According to some embodiments of the present invention the telephone number manager forwards the error message to the client, which prompts the client to re-enter the telephone number, for example (step **431**). The re-entry request supports real-time validation of the telephone numbers since the client is readily available to make any corrections for telephone numbers that fail the telephone number manager's validation rules. If the client indicates a desire to re-enter the telephone number, the process returns to step **400**. If not, the telephone number manager then stores the CC and SN telephone number components in the telephone number database (step **432**). The process then ends.

FIG. **4**B is a simplified flow diagram depicting an example of trunk prefix, area code, and extension identification operations carried out by a server. The process begins with the telephone number parser determining if a trunk prefix (TP) can be identified from the telephone number (step **450**). If a trunk prefix (TP) is found, the telephone number parser strips the trunk prefix from the telephone number (step **452**). According to an embodiment of the present invention, the telephone parser identifies the trunk prefix (TP) in the telephone number by comparing digits in the telephone number with a list of known trunk prefixes (TP) in the metadata database. If, however, a trunk prefix (TP) is not found, the telephone number parser determines if an area code (AC) can be identified from the telephone number (step **454**). If an area code (AC) can be found, the telephone number parser separates the area code (AC) from the rest of the phone number, which the telephone number parser presumes is the subscriber number (step **456**). The process then proceeds to step **458**, which illustrates the telephone number parser determining if an extension can be found in the telephone number. If an extension (EXT) is found, the telephone number parser stores the CC, AC, SN and EXT telephone number components in the telephone number database (step **460**). If an extension (EXT) is not found, the telephone number parser stores the telephone number in the CC, AC and SN telephone number components in the telephone number database (step **462**). The process then ends.

Returning to step **454**, if the telephone number parser does not find an area code (AC), the telephone number parser

attempts to identify an extension (EXT) (step **464**). If an extension (EXT) if found, the telephone number parser stores the CC, SN and EXT telephone number components in the telephone number database (step **466**). The process then ends. Returning to step **464**, if an extension (EXT) is not found, the telephone number parser stores the CC and SN telephone number components in the telephone number database (step **468**). The process then ends.

According to alternate embodiments of the present invention, the telephone number components can be validated by the telephone number manager. For example, the telephone number manager validates the identified country code component by comparing the identified country code against a list of country codes (e.g., country code column **304** within metadata database **300** of FIG. **3**A).

The telephone number manager can validate the area code, for example, by:

(1) determining that the area code includes only numbers;

(2) checking that the area code length is greater than or equal to a first predetermined minimum length and less than or equal to a first predetermined maximum length; and

(3) checking the area code using a table of area codes for a country identified by the country code.

The subscriber number can be validated, for example, by:

(1) checking that the subscriber number only includes numbers, letters, and valid delimiters; and

(2) checking that the subscriber number length is greater than or equal to a second predetermined minimum length and less than or equal to a second predetermined maximum length. The extension, if any, can also be validated by determining if the extension is greater than or equal to a third predetermined minimum length and less than or equal to a third predetermined maximum length.

FIG. **5** is a simplified flow diagram depicting an example of a telephone number assembly operation carried out by the server. The process begins with the telephone number manager receiving a telephone number request from a client (step **500**). According to some embodiments of the present invention, the telephone number manager can determine the geographic location of the requested telephone number by accessing the country ID column (e.g., country ID column **352** of FIG. **3**B) and the area code column (e.g., area code column **356** of FIG. **3**B) of telephone number database (e.g., telephone number database **348** of FIG. **3**B). The telephone number manager retrieves a present geographic location of the requesting client (step **502**). Those of skill in the art will appreciate that the present location of the requesting client can be determined in a variety of ways including, but not limited to: accessing a client profile that includes location information, Internet Protocol (IP) address tracking, use of global positioning system (GPS) data, or other location methods. Now that the telephone number manager is aware of the requesting client's geographic location and the geographic location of the requested telephone number, a telephone number assembler (e.g., telephone number assembler **241** of FIG. **2**) can determine if a call to the requested number from the requesting client's geographic location is a local, trunk, or international call (step **504**). If the call is a local call, the telephone number assembler formats and the telephone number manager presents the subscriber number component of the requested telephone number from the subscriber number column (e.g., subscriber number column **358**) from the telephone number database (step **506**). The process then ends.

If the telephone number manager determines that the call is a trunk call (e.g., a call outside of the requesting client's current area code, but within the same country as the client), the telephone number assembler determines whether or not the area code component of the requested telephone number is stored in the telephone number database (step **507**). If not, the telephone number assembler formats and the telephone number manager displays the trunk prefix from the trunk prefix column (e.g., trunk prefix column of FIG. **3**A) of a metadata database (e.g., metadata database **300** of FIG. **3**A) and the subscriber number telephone number components of the requested telephone number (step **510**). The process then ends.

Returning to step **507**, if the telephone number manager determines that the area code component of the requested telephone number is stored in the telephone number database, the telephone number assembler formats and displays the trunk prefix, area code, and subscriber number components of the requested telephone number (step **512**). The process then ends.

Returning to step **504**, if the telephone number manager determines that the call is an international call, the telephone number assembler determines whether or not the area code component of the requested telephone number is stored in the telephone number database (step **514**). If an area code component is not available, the telephone number assembler formats and displays an international access code (IAC) from the international access code column (e.g., international access code column **308** of FIG. **3**A) of the metadata database, a country code (CC) from the country code column (e.g., country code column **304** of FIG. **3**A) of the metadata database, and the subscriber number (SN) telephone number components of the requested telephone number (step **510**). The process then ends.

Returning to step **514**, if the telephone number manager determines that the area code component of the requested telephone number is stored in the telephone number database, the telephone number assembler formats and displays the international access code (IAC), country code (CC), area code (AC), and subscriber number (SN) components of the requested telephone number (step **518**). The process then ends.

An Example Computing Environment

Elements of network architecture **100** can be implemented using a variety of computer systems and networks. And example of one such computing environment is described below with reference to FIG. **6**.

FIG. **6** depicts a block diagram of a computer system **610** suitable for implementing a server (e.g., server **115** of FIG. **1** and server **201** of FIG. **2**), as well as the clients (e.g., clients **105**(**1**)-**105**(N) of FIG. **1** and client **200** of FIG. **2**) used therein. Computer system **610** includes a bus **612**, which interconnects major subsystems of computer system **610**, such as a central processor **614**, a system memory **617** (typically random-access memory (RAM), but which may also include read-only memory (ROM), flash ROM, or the like), an input/output controller **618**, an external audio device, such as speaker system **620** via an audio output interface **622**, an external device, such as a display screen **624** via display adapter **626**, serial ports **628** and **630**, a keyboard **632** (interfaced with keyboard controller **633**), a storage interface **634**, a floppy disk drive **637** operative to receive a floppy disk **638**, a host bus adapter (HBA) interface card **635**A operative to connect with a Fibre Channel network **690**, a host bust adapter (HBA) interface card **635**B operative to connect to a SCSI bus **639**, and an optical disk drive **640** operative to receive an optical disk **642**. Also included are a mouse **646** (or other point-and-click device, coupled to bus **612** via serial port **628**), a modem **647** (coupled to bus **612** via serial port **630**), and a network interface **648** (coupled directly to bus **612**).

Bus **612** allows data communication between central processor **614** and system memory **617**, which may include read-only memory (ROM) or flash memory (neither shown) and random access memory (RAM) (not shown), as previously noted. RAM is generally the main memory into which operating system and application programs are loaded. ROM or flash memory can contain, among other code, the Basic Input-Output system (BIOS) which controls basic hardware operation such as the interaction with peripheral components. Applications resident with computer system **610** are generally stored on and accessed via a computer-readable medium, such as hard disk drive (e.g., fixed disk **644**), an optical drive (e.g., optical drive **640**), a floppy disk unit **637**, or other storage medium.

Storage interface **634**, as with other storage interfaces of computer system **610**, can connect to a standard computer-readable medium for storage and/or retrieval of information, such as a fixed disk drive **644**. Fixed disk drive **644** may be a part of computer system **610** or may be separate and accessed through other interface systems. Modem **647** may provide a direct connection to a remote server via a telephone link or to the Internet via an internet service provider (ISP). Network interface **648** may provide a direct connection to a remote server via a direct network link to the Internet via a point-of-presence (POP). Network interface **648** may provide such connection using wireless techniques, including digital cellular telephone connection, Cellular Digital Packet Data (CDPD) connection, digital satellite data connection or the like.

Many other devices or subsystems (not shown) may be connected in a similar manner (e.g., document scanners, digital cameras, and so on). Conversely, all of the devices shown in FIG. **6** need not be present. The devices and subsystems can be interconnected in different ways from that shown in FIG. **6**. The operation of the computer system such as that shown in FIG. **6** is readily known in the art and is not discussed in detail in this application. Code to implement the previously-described features can be stored in computer-readable storage media such as one or more of system memory **617**, fixed disk **644**, optical disk **642**, or floppy disk **638**. The operating system provided on computer system **610** may be MS-DOS®, MS-WINDOWS®, OS/2®, UNIX®, Linux®, or other known operating system.

Moreover, regarding the messages and/or data signals described herein, those skilled in the art will recognize that a signal may be directly transmitted from a first block to a second block, or a signal may be modified (e.g., amplified, attenuated, delayed, latched, buffered, inverted, filtered, or otherwise modified) between the blocks. Although the signals of the above described embodiment are characterized as transmitted from one block to the next, other embodiments may include modified signals in place of such directly transmitted signals as long as the informational and/or functional aspect of the signals is transmitted between the blocks. To some extent, a signal input at a second block may be conceptualized as a second signal derived from a first signal output from a first block due to the physical limitations of the circuitry involved (e.g., there will inevitably be some attenuation and delay). Therefore, as used herein, a second signal derived from the first signal includes the first signal or any modifications to the first signal, whether due to circuit limitations or due to passage through other circuit elements which do not change the informational and/or final functional aspect of the first signal.

Although the present invention has been described in connection with several embodiments, the invention is not intended to be limited to the specific forms set forth herein. On the contrary, it is intended to cover such alternatives, modifications, and equivalents as can be reasonably included within the scope of the invention as defined by the appended claims.

What is claimed is:

1. A computer-implemented method, implemented in a computer system, comprising:

importing a first telephone number database from a first system into a second telephone number database stored on a second system, wherein

the first system and the second system are located in geographically disparate regions,

the first telephone number database comprises a plurality of telephone numbers,

the importing comprises

batch processing the plurality of telephone numbers, and

generating a plurality of telephone number components by parsing the plurality of telephone numbers;

in response to receiving a request for a telephone number of the plurality of telephone numbers at the computer system, generating, using one or more processors of the computer system, a ready-to-dial telephone number, wherein the generating comprises

determining a geographic location from which the ready-to-dial telephone number is to be dialed,

determining a target location of the telephone number,

retrieving a first set of telephone number components of the plurality of telephone number components from the second telephone number database, wherein

the first set of telephone number components comprise at least a part of the telephone number,

retrieving a second set of telephone number components, wherein

the second set of telephone number components are not part of the plurality of telephone number components, and

one or more components of the second set of telephone number components are required to generate the ready-to-dial telephone number, and

assembling components of the first set of telephone number components and components of the second set of telephone number components into the ready-to-dial telephone number; and

in response to the generating, presenting the ready-to-dial telephone number to a user of the second system.

2. The method of claim **1**, wherein

the second set of telephone number components are retrieved from a metadata database,

the target location is another geographic location to which the ready-to-dial telephone number is to be dialed from the geographic location,

the request comprises one or more components of the first set of telephone number components, and

the one or more components in the request are a subset of components in the ready-to-dial telephone number.

3. The method of claim **2**, wherein

the one or more components in the request are not consistent with a dialing plan for the location from which the ready-to-dial telephone number is to be dialed.

4. The method of claim **1**, wherein the parsing further comprises:

identifying a country code component in the telephone number by parsing a first character in the telephone number to identify a "+" character.

5. The method of claim 1, wherein the parsing further comprises:
identifying a country code component in the telephone number by identifying an international access code component in the telephone number.
6. The method of claim 1, further comprising:
validating a country code component of the telephone number using a telephone country code table;
validating an area code component of the telephone number by
determining that the area code component comprises only numbers,
checking that a length of the area code component is greater than or equal to a first predetermined minimum length and less than or equal to a first predetermined maximum length, and
checking the area code component using a table of area codes for a country identified by the country code component; and
validating a subscriber number component of the telephone number by
checking that the subscriber number component only comprises numbers, letters, and valid delimiters, and
checking that a length of the subscriber number component is greater than or equal to a second predetermined minimum length and less than or equal to a second predetermined maximum length.
7. The method of claim 1, wherein the generating further comprises:
comparing the geographic location from which the ready-to-dial telephone number is to be dialed and the target location of the telephone number;
when the location from which the ready-to-dial telephone number is to be dialed and the target location are in different countries, generating the ready-to-dial telephone number by concatenating at least a country code component, a trunk prefix component, an area code component, and a subscriber number component of the first set of telephone number components;
when the location from which the ready-to-dial telephone number is to be dialed and the target location are in different cities within a country, generating the ready-to-dial telephone number by concatenating at least the trunk prefix component, the area code component, and the subscriber number component; and
when the location from which the ready-to-dial telephone number is to be dialed and the target location are in a same city, generating the ready-to-dial telephone number by retrieving at least the subscriber number component.
8. The method of claim 1, wherein the determining the geographic location from which the ready-to-dial telephone number is to be dialed comprises:
determining the geographic location from which the request for the telephone number originated.
9. The method of claim 1, wherein the generating further comprises:
prefacing the ready-to-dial telephone number with a code that specifies a particular long distance provider.
10. The method of claim 9, wherein
the plurality of telephone number components comprises the code that specifies the particular long distance provider.
11. The method of claim 1, wherein the generating further comprises:
when the geographic location from which the ready-to-dial telephone number is to be dialed and the target location are in a same city, generating the ready-to-dial telephone number by retrieving a subscriber number component, wherein
the ready-to-dial telephone number does not comprise a country code component or a trunk prefix component.
12. The method of claim 1, wherein
the plurality of telephone number components comprises a third set of telephone number components,
the third set of telephone number components is associated with a subscriber,
the third set of telephone number components comprises one or more of
a country code associated with the subscriber,
a trunk prefix associated with the subscriber,
an area code associated with the subscriber,
a subscriber number associated with the subscriber, or
an international access code associated with the subscriber, and
the generating comprises
selecting, based on the request, the first set of telephone number components from the third set of telephone number components.
13. The method of claim 1, wherein presenting the ready-to-dial telephone number comprises at least one of:
displaying the ready-to-dial telephone number,
automatically dialing the ready-to-dial telephone number, or
sending the ready-to-dial telephone number to a remote location via a messaging service.
14. The method of claim 1, wherein
the first system is a first customer relationship management (CRM) system,
the second system is a second CRM system,
the first CRM system stores the plurality of telephone numbers in the first telephone number database, and
and the plurality of telephone numbers are entered into the first telephone number database by a plurality of disparate persons at a plurality of disparate geographical locations.
15. The method of claim 1, wherein
the plurality of telephone numbers are un-validated prior to being imported into the second telephone number database from the first telephone number database, and
as a result of being un-validated, the telephone number of the plurality of telephone numbers is not the ready-to-dial telephone number from the geographic location.
16. A non-transitory computer program product comprising:
a plurality of instructions comprising
a first set of instructions, executable on a computer system, configured to
import a first telephone number database from a first system into a second telephone number database stored on a second system, wherein the first system and the second system are located in geographically disparate regions,
the first telephone number database comprises a plurality of telephone numbers,
the importing comprises
batch processing the plurality of telephone numbers, and
generating a plurality of telephone number components by parsing the plurality of telephone numbers;
a second set of instructions, executable on a computer system, configured to generate a ready-to-dial telephone number from a plurality of telephone number compo-

nents, in response to receipt of a request for a telephone number of the plurality of telephone numbers, wherein the second set of instructions comprises

a first subset of instructions, executable on the computer system, configured to determine a geographic location from which the ready-to-dial telephone number is to be dialed,

a second subset of instruction, executable on the computer system, configured to determine a target location of the telephone number,

a third subset of instructions, executable on the computer system, configured to retrieve a first set of telephone number components of the plurality of telephone number components from the second telephone number database, wherein

the first set of telephone number components comprise at least a part of the telephone number,

a fourth subset of instructions, executable on the computer system, configured to retrieving a second set of telephone number components, wherein

the second set of telephone number components are not part of the plurality of telephone number components, and

one or more components of the second set of telephone number components are required to generate the ready-to-dial telephone number, and

a fifth subset of instructions, executable on the computer system, configured to assemble components of the first set of telephone number components and components of the second set of telephone number components into the ready-to-dial telephone number

and

a third set of instructions, executable on the computer system, configured to present the ready-to-dial telephone number, in response to the generation of the ready-to-dial telephone number to a user of the second system; and

a non-transitory computer-readable storage medium, wherein the instructions are encoded in the non-transitory computer-readable storage medium.

17. The non-transitory computer program product of claim **16**, wherein

the second set of telephone number components are retrieved from a metadata database,

the target location of the telephone number is another geographic location to which the ready-to-dial telephone number is to be dialed from the geographic location,

the request comprises one or more components of the first set of telephone number components, and

the one or more components in the request are a subset of components in the ready-to-dial telephone number.

18. The non-transitory computer program product of claim **16**, wherein the plurality of instructions further comprise:

a fourth set of instructions, executable on the computer system, configured to identify a country code component in the telephone number, wherein the fourth set of instructions is further configured to parse a first character in the telephone number to identify a "+" character.

19. The non-transitory computer program product of claim **16**, wherein the plurality of instructions further comprise:

a fifth set of instructions, executable on the computer system, configured to identify a country code component in the telephone number, wherein

the fifth set of instructions is further configured to identify an international access code among the plurality of telephone number components.

20. The non-transitory computer program product of claim **16**, wherein the instructions further comprise:

a sixth set of instructions, executable on the computer system, configured to validate a country code component of the telephone number using a telephone country code table;

a seventh set of instructions, executable on the computer system, configured to validate an area code component of the telephone number, wherein the seventh set of instructions comprises

a first subset of instructions configured to determine that the area code component comprises only numbers,

a second set of instructions configured to check that a length of the area code component is greater than or equal to a first predetermined minimum length and less than or equal to a first predetermined maximum length, and

a third subset of instructions configured to check the area code component using a table of area codes for a country identified by the country code component; and

an eighth set of instructions, executable on the computer system, configured to validate a subscriber number component of the telephone number, wherein the eighth set of instructions comprises

a first subset of instructions configured to check that the subscriber number component only comprises numbers, letters, and valid delimiters, and

a second subset of instructions configured to check that a length of the subscriber number component is greater than or equal to a second predetermined minimum length and less than or equal to a second predetermined maximum length.

21. The non-transitory computer program product of claim **16**, wherein the plurality of instructions further comprise:

a ninth set of instructions, executable on the computer system, configured to compare the location from which the ready-to-dial telephone number is to be dialed and the target location of the telephone number;

a tenth set of instructions, executable on the computer system, configured to generate the ready-to-dial telephone number by concatenating at least a country code component, a trunk prefix component, a area code component, and a subscriber number component of the first set of telephone number components, when the location from which the ready-to-dial telephone number is to be dialed and the target location are in different countries;

a eleventh set of instructions, executable on the computer system, configured to generate the ready-to-dial telephone number by concatenating at least the trunk prefix component, the area code component, and the subscriber number component, when the location from which the ready-to-dial telephone number is to be dialed and the target location are in different cities within a country; and

a twelfth set of instructions, executable on the computer system, configured to generate the ready-to-dial telephone number by retrieving at least the subscriber number component, when the location from which the ready-to-dial telephone number is to be dialed and the target location are in a same city.

22. The non-transitory computer program product of claim **16**, wherein the instructions further comprise:

a thirteenth set of instructions, executable on the computer system, configured to determine

the geographic location from which the request for the telephone number originated.

23. The non-transitory computer program product of claim 16, wherein the instructions further comprise:

a fourteenth set of instructions, executable on the computer system, configured to preface the ready-to-dial telephone number with a code that specifies a particular long distance provider.

24. An apparatus comprising:

importing means for importing a first telephone number database from a first system into a second telephone number database stored on a second system, wherein

the first system and the second system are located in geographically disparate regions,

the first telephone number database comprises a plurality of telephone numbers,

the importing comprises

batch processing the plurality of telephone numbers, and

generating a plurality of telephone number components by parsing the plurality of telephone numbers;

generating means for generating, in response to receiving a request for a telephone number of the plurality of telephone numbers, a ready-to-dial telephone number from a plurality of telephone number components, wherein the generating means comprises

first determining means for determining a geographic location from which the ready-to-dial telephone number is to be dialed,

second determining means for determining a target location of the telephone number,

a first retrieving means for retrieving a first set of telephone number components of the plurality of telephone number components from the second telephone number database, wherein

the first set of telephone number components comprise at least a part of the telephone number,

a second retrieving means for retrieving a second set of telephone number components, wherein

the second set of telephone number components are not part of the plurality of telephone number components, and

one or more components of the second set of telephone number components are required to generate the ready-to-dial telephone number, and

assembling means for assembling components of the first set of telephone number components and components of the second set of telephone number components into the ready-to-dial telephone number; and

presenting means for presenting, in response to an input from the generating means, the ready-to-dial telephone number to a user of the second system.

25. The apparatus of claim 24, wherein the apparatus further comprises:

means for comparing each component of the second set of telephone number components with known telephone number components stored in a metadata database, wherein the known telephone number components comprise at least one of

a country code,

a trunk prefix,

an area code,

a subscriber number,

an extension, and

an international access code.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 9,277,053 B2
APPLICATION NO. : 12/263209
DATED : March 1, 2016
INVENTOR(S) : Fallen-Bailey

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Specification

In column 4, line 18, delete "country," and insert -- country. --, therefor.

In column 8, line 53, delete "be use" and insert -- be used --, therefor.

Claims

In column 16, line 36, in claim 14, before "the plurality" delete "and".

Signed and Sealed this
Twentieth Day of September, 2016

Michelle K. Lee

Michelle K. Lee
Director of the United States Patent and Trademark Office